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RETROSPECT OF PATHOLOGY.

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Diphtheria.—A number of important papers have recently been published on the bacteria found in connection with this disease. Since Loeffler announced the occurrence of a specific bacillus in all cases of true diphtheria, the matter has received special attention at the hands of bacteriologists. A point of special interest was to ascertain the nature of primary croupous laryngitis, and to learn if the local membranous inflammations occurring in the intestine, bladder, skin, etc., were really diphtheritic in their nature. Paltauf and Kolisko (*Wiener Med. Wochensch.*, No. 8, 1889) found Loeffler's bacilli present in the cases of membranous croup which they examined, and therefore regard both croup and diphtheria as infective. In local diphtheritis in other situations they were unable to find these bacilli. The bacilli, when present, were always accompanied by streptococci and staphylococci.

R. Wurtz and H. Bourges (*Archives de Med. Exp.*, May, 1890) examined the bacteria present in nine cases of diphtheritis accompanying scarlatina. Of these, in seven the diphtheritic condition appeared early (*precoce*) and in two late (*tardive*). In the seven cases where it appeared early streptococci were found, occurring in chains, resembling, but not absolutely identical with, those found in erysipelas. In six of the cases they were accompanied by pyogenic staphylococci; none presented Loeffler's bacilli. In two cases where the diphtheria set in late (6th and 9th day), Loeffler's bacilli were found in both instances.

T. M. Prudden of New York (*Amer. Jour. Med. Sci.*, May,

1889) examined 24 cases of diphtheria in children, either primary or in connection with suppuration, scarlatina, measles, etc. He did not find Loeffler's bacilli in a single instance, although the examination on this point was directed with the greatest care. In two cases of scarlatinal diphtheria staphylococcus aureus alone was found. In the remaining 22 cases streptococci were found in both local lesions and the viscera. Where the condition was complicated by pneumonia, chains of cocci were found in great abundance in the exudation. These cocci were absent from the throat and tonsils of 31 healthy children not exposed to infection, but among 40 children in good health, but living in a hospital where the disease was epidemic, the cocci were found in twelve instances. Inoculation with these organisms did not produce in animals any disease fairly analogous to the diphtheria occurring in the human subject.

In the researches already quoted it will be noticed that there is a diversity of opinion as to the nature of the pathogenic agent in this disease, and the experiments on animals do not appear conclusive. The induced disease was always a sort of septicæmia, the local manifestations being far from characteristic and the inoculated organisms being found after death in the blood and internal organs.

Some recent experimental researches are far more satisfactory from being in harmony with what we know of the disease in man. Roux and Yersin (*Annales de l'Inst. Pasteur*, Dec., 1888) investigated 15 cases, and found Loeffler's bacillus present in all of them. With cultures of the bacilli they were able not only to induce typical pseudo-membranous inflammations in animals, but these inoculations were followed by paralyses corresponding to those occurring after diphtheria in man. Further, they were able to obtain by filtration a toxic substance from their cultures capable of producing this paralysis without the aid of the living bacteria. This poison was thought to be of the nature of a diastase or ferment. A small dose of the poison given subcutaneously produced local inflammation (without pseudo-membrane) followed by congestion and hemorrhages in the internal organs, especially the kidneys. The paralytic action of the poison where very small doses were given was often greatly delayed, which may serve to explain the late onset of the corresponding symptoms in man.

These results have since been confirmed and extended by V. Babes of Bucharest (*Virchow's Archiv*, Bd. 119), who found Loeffler's bacilli present in all cases. He was able also to produce typical diphtheritic inflammation in rabbits by inoculation in the conjunctiva, either with pure cultures or simply with small particles of diphtheritic membrane. Pure cultures, filtered through a Pasteur-Chamberland porcelain filter, yielded a clear fluid free from micro-organisms, but containing a toxin differing from any hitherto described, and apparently analogous with the substance found by Roux. Injection of 30 ccm. of this fluid subcutaneously in rabbits caused death in 24–48 hours with symptoms of progressive paralysis of the muscles, respiration and heart. When 5–10 ccm. only were injected, the animals lived for several weeks, but usually died with symptoms of a paralysis not unlike that of rabies, commencing by a weakness in the hinder extremity and leading in a few hours to complete paraplegia, followed shortly by paralysis of the heart and respiration. The autopsies showed parenchymatous degeneration of the liver and kidneys, with proliferation of nuclei about the minute blood-vessels. He did not succeed in producing a false membrane by injections of the filtered bouillon cultures, nor with any of the cocci found associated with Loeffler's bacillus. The cocci simply produce inflammation with necrosis, and so prepare the way for the action of the specific poison. In animals which had been inoculated with the bacillus, it was only found after death in the immediate neighborhood of the inoculation, corresponding exactly to what had been observed by Loeffler in human diphtheria. An attempt was made to secure immunity by protective vaccination, but without success, as animals which had survived appeared only to acquire a very slight degree of immunity limited strictly to the very site of the previous inoculation. Lastly, a series of therapeutic and prophylactic experiments were tried, the rabbits' corneæ being treated with various antiseptic agents, either before or after inoculation. It was found, contrary to the supposition of Roux and Yersin, that carbolic acid in 20 per cent. solution was not only unable to check the formation of pseudo-membrane, but actually, through its irritating effect, predisposed to it. The same was found to apply to 10 per cent. citric and 5 per cent. acetic acid. On the other hand, 1–4000 sublimate and 1–1000 permanganate of potassium, 1–5 alcohol, 1–50 chloral, and 1–20 boracic acid were unirritating and sufficed to check the formation of membrane.

E. Klein of London, whose views were previously at variance with Loeffler's, has recently examined 22 cases of typical pharyngeal diphtheria, finding a bacillus identical with that of Loeffler in every case. In 12 cases he found a bacillus almost identical in appearance and mode of growth, but devoid of pathogenic properties.

Organization of Thrombi.—R. Beneke of Leipzig has published some important results obtained in investigating this obscure subject. It is well known that the blood retained in a vessel between double ligatures may remain fluid for weeks or even months if the operation has been done aseptically, and even if a clot has formed, the length of time which elapses before it begins to organize is very variable. Beneke, without going deeply into the cause of the blood remaining fluid, has studied the conditions which attend the organization of the thrombus. He considers that it is the effect of the intervascular pressure on the cells composing the vessel wall which determines its occurrence or otherwise. When the vessel remains distended with blood between the double ligatures no organization occurs; and, microscopically, the walls of the vessel retain their normal appearance even in the immediate vicinity of the ligatures. On the other hand, if the vessel is collapsed at the time of the ligation, a condition favorable to proliferation of the connective tissue of the vessel wall with the vasa vasorum, at the spot at which organization commenced there was always an overgrowth of the intima, which appeared to take an active part in the process.—(*Ziegler's Beitrage, vol. vii.*)

How far may a Cow be Tuberculous before her Milk becomes Dangerous as an Article of Food?—The elaborate researches made on this subject by Dr. H. C. Ernst of Boston have recently been published in full (*Transactions American Association of Physicians*, vol. iv). These investigations have been made on a scale and with an amount of precaution rarely met with, and are on that account most trustworthy. It had hitherto been supposed that as long as the udder of a tuberculous cow remained free from the disease the possibility of infection from consumption of the milk was practically nil. It was conceded, of course, that tuberculo-mastitis might be present to such an extent as to infect the milk without giving any external evidences during the lifetime of the animal, though even this was disputed. Dr. Ernst's experiments have led to the startling conclusion that the milk may be highly infectious where no disease of the udder is discoverable after death even with the aid of the microscope. The investigation consisted in microscopic examinations, inoculation of rabbits and guineapigs, and feeding experiments with calves and pigs. The feeding experiments were performed on a farm specially set apart for the purpose by the Massachusetts Society for Promoting Agriculture. To avoid the possibility of accidental infection the whole place was thoroughly disinfected and kept scrupulously clean during the experiments, all utensils being sterilized by heat.

Microscopical Examination—114 samples of milk, taken from 36 cows in various stages of tuberculosis, but all free from affection of the udder, gave positive results in 17 samples from 10 different cows. Tubercle bacilli were actually seen in the milk of 27 per cent. of the cows examined. To ensure this result about 20 cover-glass preparations had to be examined on each sample. Inoculation of 49 rabbits with samples from 13 cows gave positive results in 10 per cent. Inoculation of 54 guineapigs with samples from 14 cows gave 42.8 p.c. of positive results. In the feeding experiments in 13 calves, 41 per cent., and with 5 pigs 40 per cent. became tuberculous. At the time of writing the paper almost all the cows from which the samples were taken had been killed, and though all showed the presence of tubercle in some part of the body, not one showed tuberculosis of the udder. Dr. Ernst concludes that the milk from a cow affected with tuberculosis in any part of the body may contain the virus whether the udder is affected or not. Unfortunataly that part of the research most interesting from a scientific point of view, viz., the exact anatomical condition of the udder, appears not to have received the same amount of attention given to the preliminary details, and the statements on this point are anything but satisfactory. The practical point that milk may be capable of conveying tuberculous infection when no disease is recognizable in the udder is, however, proved beyond doubt.

On Hypertrophy of the Heart in Bright's Disease.—H. F. Formad of Philadelphia, in the course of 300 autopsies in cases of Bright's disease, found the heart hypertrophied in 62 per cent. of the cases, the left ventricle alone being affected in 34 per cent. and both ventricles in 28 per cent. The condition associated with the greatest degree of hypertrophy were (1) fatty and contracted kidney (late parenchymatous nephritis) occurring in 29 per cent. of the cases of general hypertrophy of both ventricles and 26 per cent. of those where the left ventricle alone was affected, and (2) red granular kidney in 44 per cent. of cases of left and 26 per cent. of symmetrical hypertrophy. The greatest degree of enlargement was found in cases where heart disease was also present, though cases of venous induration were not included. The average size of the heart was 10 oz. in acute Bright's disease, 15 oz. in large white kidney, 14 oz. in fatty, contracted kidney, and 17 oz. in red, granular kidney. Arterial changes (endoarteritis and periarteritis) were found only with the red granular kidney. Cases of senile atrophy were excluded, as were also cases of amyloid kidney. It is stated, however, that with amyloid kidney hypertrophy of the heart occurs as often as in any of the other forms, the absolute weight remaining low because of the originally defective development of the circulatory system in these individuals. An apparently small heart occurring in a scrofulous subject may really represent a considerable degree of hypertrophy.—(*Trans. Assoc. of Amer. Phys., vol. iv.*)

The Connection between Morbid Conditions of the Stomach and those of the Nervous System.—P. Cuffer (*Revue de Méde-*

cine, April 1890) describes four cases of cancer of the stomach where symptoms of bulbar paralysis appeared. He thinks that in addition to temporary reflex cerebral conditions, a permanent organic lesion of the medulla oblongata can be produced through an ascending neuritis of the pneumogastric. No reports of autopsies are given to confirm these views.